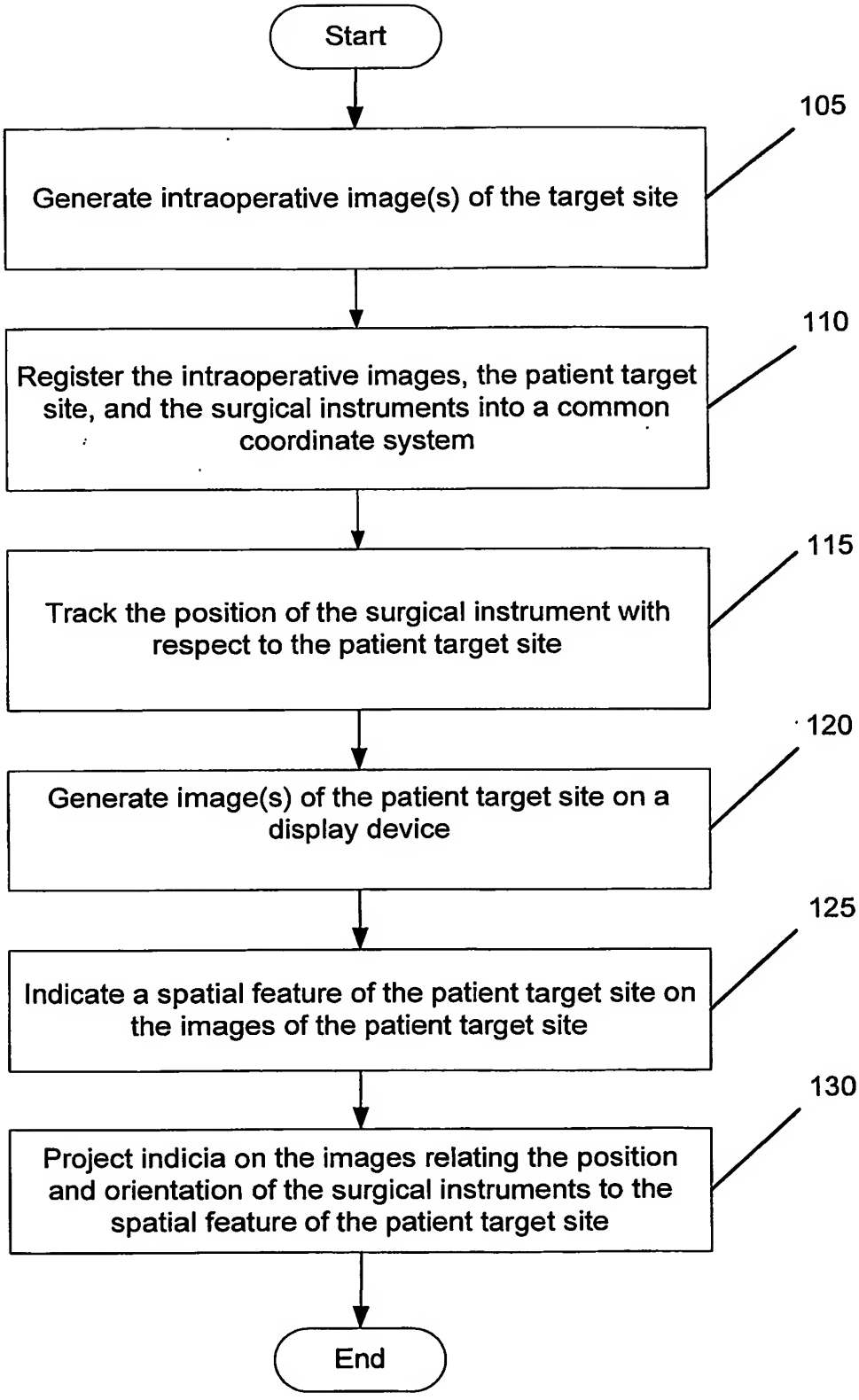
Start
105
Generate intraoperative image(s) of the target site
110
Register the intraoperative images, the patient target site, and the surgical instruments into a common coordinate system
115
Track the position of the surgical instrument with respect to the patient target site
120
Generate image(s) of the patient target site on a display device
125
Indicate a spatial feature of the patient target site on the images of the patient target site
130
Project indicia on the images relating the position and orientation of the surgical instruments to the spatial feature of the patient target site
End

Figure 1

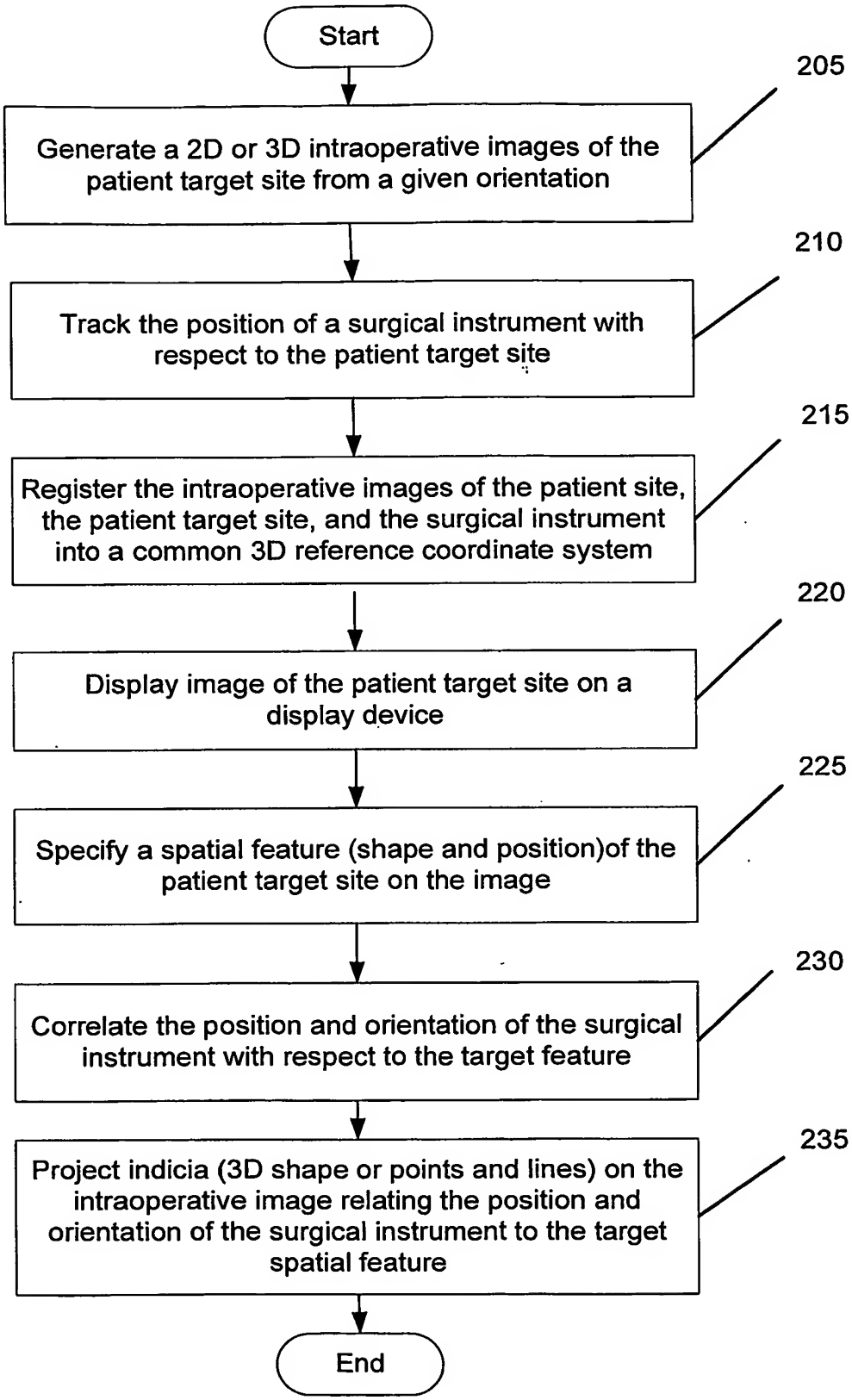
Start
205
Generate a 2D or 3D intraoperative images of the patient target site from a given orientation
210
Track the position of a surgical instrument with respect to the patient target site
215
Register the intraoperative images of the patient site, the patient target site, and the surgical instrument into a common 3D reference coordinate system
220
Display image of the patient target site on a display device
225
Specify a spatial feature (shape and position)of the patient target site on the image
230
Correlate the position and orientation of the surgical instrument with respect to the target feature
235
Project indicia (3D shape or points and lines) on the intraoperative image relating the position and orientation of the surgical instrument to the target spatial feature
End

Figure 2

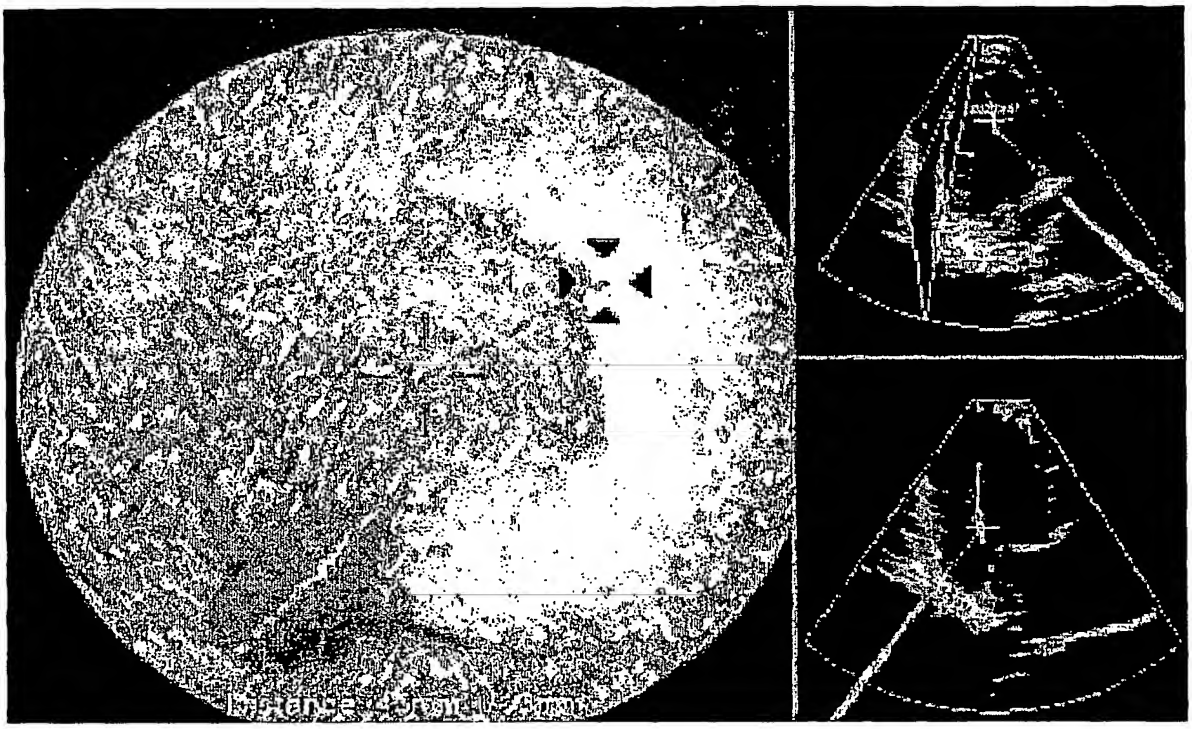

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Figure 3

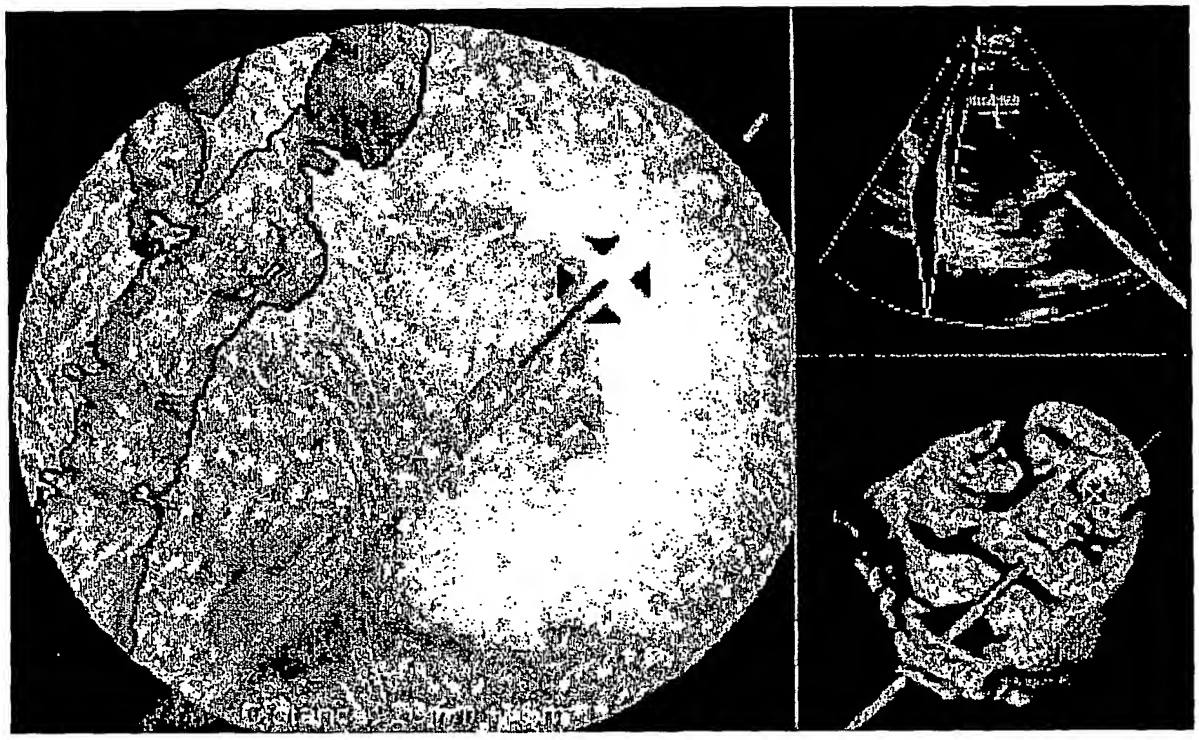

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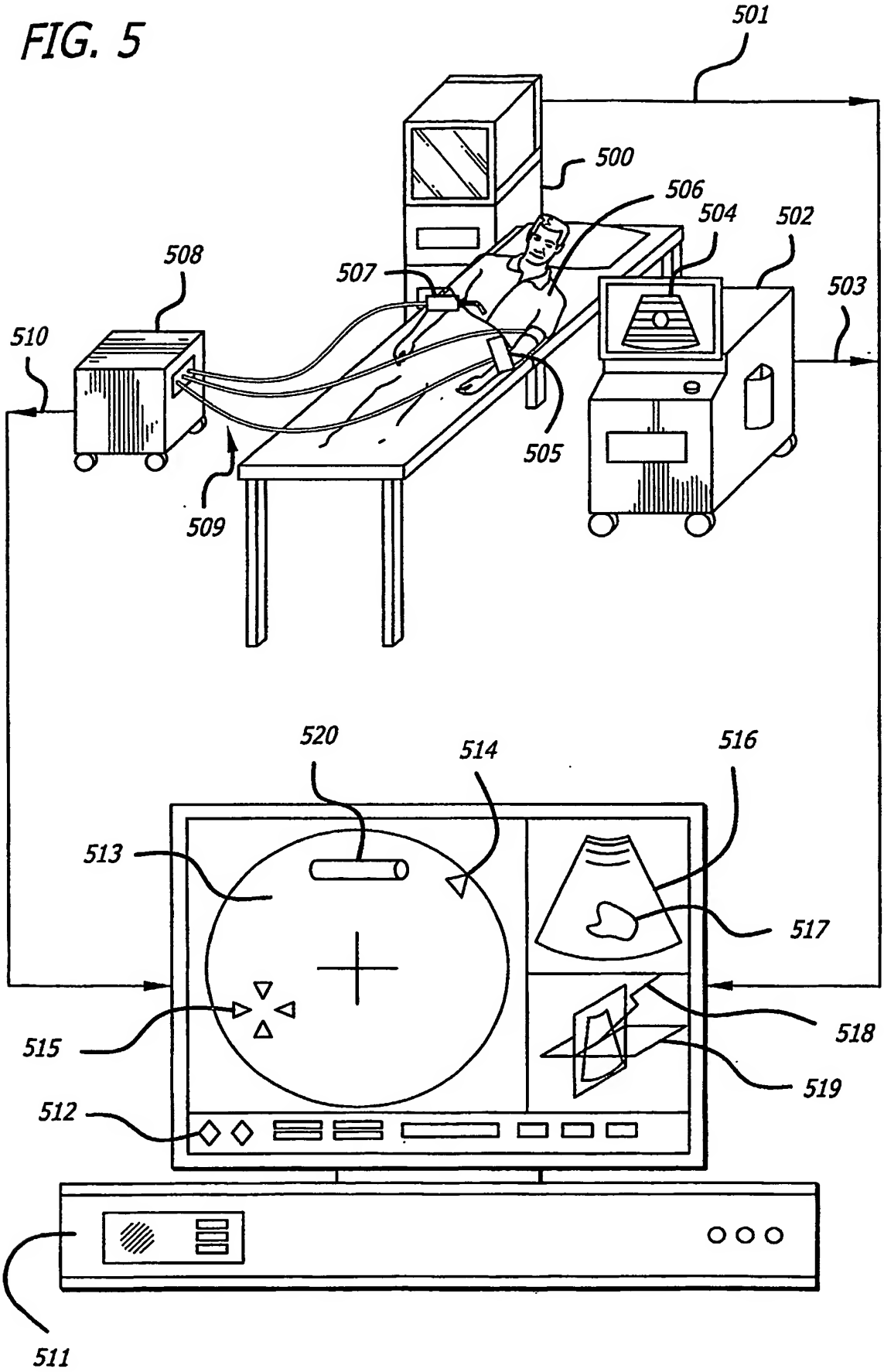
Figure 4

FIG. 5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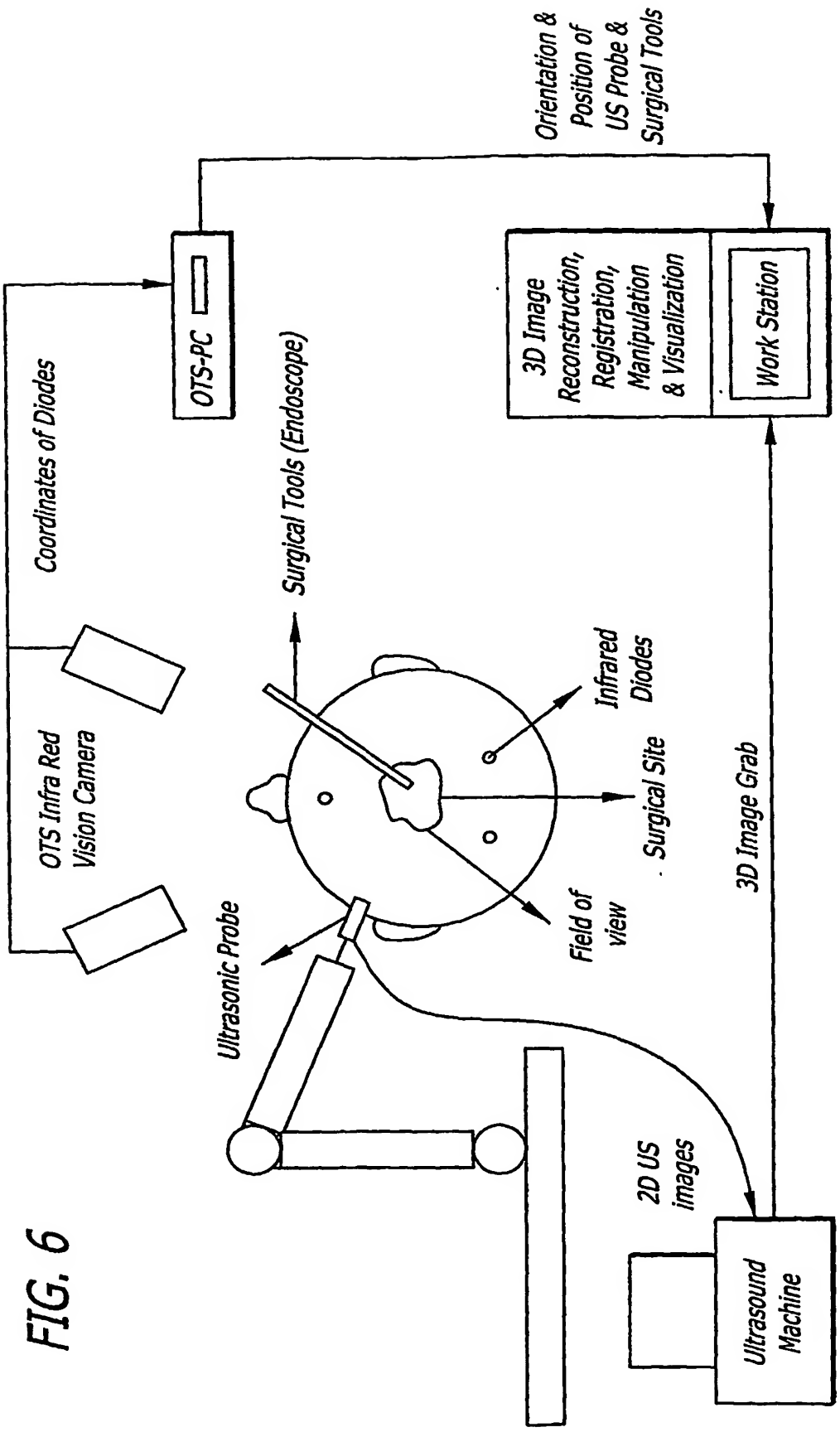
Orientation & Position of US Probe & Surgical Tools
OTS-PC
3D Image Reconstruction, Registration, Manipulation & Visualization
Work Station
Coordinates of Diodes
Surgical Tools (Endoscope)
OTS Infra Red Vision Camera
Infrared Diodes
Surgical Site
Field of view
3D Image Grab
Ultrasonic Probe
2D US images
Ultrasound Machine

FIG. 6